

4.3

Isosceles and Equilateral Triangles

Goal Use properties of isosceles and equilateral triangles.

VOCABULARY

Legs of an isosceles triangle

Base of an isosceles triangle

Base angles of an isosceles triangle

THEOREM 4.3: BASE ANGLES THEOREM

Words If two sides of a triangle are congruent, then the angles opposite them are _____.

Symbols If $\overline{AB} \cong \overline{AC}$, then $\angle B \cong$ _____.



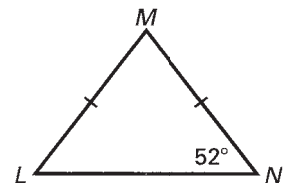
Example 1 Use the Base Angles Theorem

Find the measure of $\angle L$.

Solution

Angle L is a base of an isosceles triangle. From the Base Angles Theorem, $\angle L$ and _____ have the same measure.

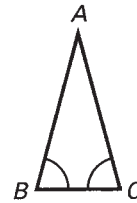
Answer The measure of $\angle L$ is _____.



THEOREM 4.4: CONVERSE OF THE BASE ANGLES THEOREM

Words If two _____ of a triangle are congruent, then the _____ opposite them are congruent.

Symbols If $\angle B \cong \angle C$, then $\overline{AC} \cong$ _____.

**Example 2** *Converse of the Base Angles Theorem*

Find the value of x .

Solution

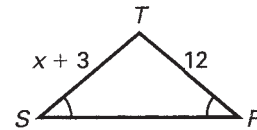
By the Converse of the Base Angles Theorem, the legs have the same length.

$$TS = TP$$

$$x + \underline{\hspace{1cm}} = \underline{\hspace{1cm}} \quad \text{Substitute for } \underline{\hspace{1cm}} \text{ and } \underline{\hspace{1cm}}.$$

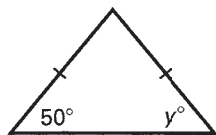
$$x = \underline{\hspace{1cm}} \quad \text{Subtract } \underline{\hspace{1cm}} \text{ from each side.}$$

Answer The value of x is ____.

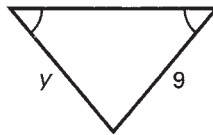


✔ **Checkpoint** Find the value of y .

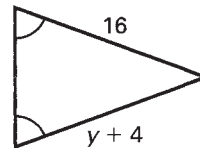
1.



2.



3.



THEOREM 4.5: EQUILATERAL THEOREM

Words If a triangle is equilateral, then it is _____.

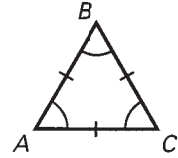
Symbols If $\overline{AB} \cong \overline{AC} \cong \overline{BC}$, then $\angle A \cong \angle B \cong \angle C$.

THEOREM 4.6: EQUIANGULAR THEOREM

Words If a triangle is equiangular, then it is _____.

Symbols If $\angle B \cong \angle C \cong \angle A$, then

$\overline{AB} \cong \overline{BC} \cong \overline{AC}$.

**Example 3** *Side Length of an Equiangular Triangle*

Find the length of each side of the equiangular triangle.

Solution

The angle marks show that $\triangle QRT$ is equiangular.

So, $\triangle QRT$ is also _____.

$$3x = \underline{\hspace{2cm}}$$

Sides of an equilateral triangle are congruent.

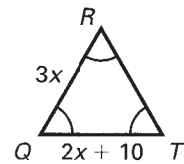
$$x = \underline{\hspace{2cm}}$$

Subtract _____ from each side.

$$3(\underline{\hspace{1cm}}) = \underline{\hspace{2cm}}$$

Substitute _____ for x .

Answer Each side of $\triangle QRT$ is _____.



Follow-Up Compare Example 2 and Example 3.

How are they alike?

How are they different?